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Draft Record of Decision

Resurrection Creek Phase II: Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations

Forest Service | Chugach National Forest | Seward Ranger District | R10-MB-789a March 2015

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Introduction

The Resurrection Creek Phase II Stream and Riparian Restoration project is the result of collaboration between Hope Mining Company and the Forest Service. The project is located on National Forest System lands overlain with federal mining claims and was developed in conjunction with existing and proposed mining activities. Both the Forest Service and Hope Mining Company saw the success of the first Resurrection Creek Stream and Riparian Restoration Project (Phase I) and worked together developing the Phase II proposed project for mutual benefit. The Forest Service would benefit from the opportunity to restore the stream channel, floodplains, and habitat conditions along this 2.2-mile segment of Resurrection Creek that were degraded by historic mining in the early 1900s. Hope Mining Company would benefit from improved access to existing and proposed mining areas by means of a temporary bridge installed by the Forest Service for restoration activities. Realigning the stream channel for restoration purposes would enable Hope Mining Company to build settling ponds in a section of former creek bed on the west side of the Phase II stream restoration corridor and facilitate mining in abandoned channel segments.

Both the Forest Service and Hope Mining Company recognize the compromises necessary to implement this project. The Forest Service is limited in the breadth of restoration possible within the historic floodplain due to mining infrastructure and the existing and proposed mining operations. Hope Mining Company is willingly limiting some of their operational flexibility and voluntarily excluding most mining activities within the proposed restoration corridor that overlays their federal mining claims.

The Forest Service has invested time in collaborating with Hope Mining Company and analyzed this project in order to improve aquatic and riparian habitat while ensuring reasonable access to existing and proposed mining areas and mining infrastructure.

Restoration work is necessary because the natural stream channel processes and aquatic habitat within the project area have been significantly altered by mining activities from the early 1900s. All five species of anadromous salmonids are present in Resurrection Creek; pink (*Oncorhynchus gorbuscha*), chum (*O. keta*), coho (*O. kisutch*), Chinook (*O. tshawytscha*), and sockeye salmon (*O. nerka*). Historic mining methods resulted in loss of soil and changed the complex of stream channels and floodplains. Mine tailings entrenched the stream and eliminated flood water access to the historic floodplain. The direct impact of disturbance and loss of the stream's ability to access the floodplain have adversely altered aquatic habitat and riparian vegetation composition. Without mechanical intervention to re-establish fully functioning stream components, habitat will continue to be adversely affected and limit biological production within the project area indefinitely.

Background

Resurrection Creek was the location of one of Alaska's first gold rushes starting in the late 1800s. From the early 1900s through 1942, hydraulic and heavy equipment placer mining affected the lower six miles of Resurrection Creek. Natural hydrologic processes in Resurrection Creek have not substantially altered the trench-like condition of the channel over the last century. We completed the Resurrection Creek Phase I Stream Restoration Project between 2005 and 2006, mitigating the impacts from historic mining approximately one mile upstream from the current project area. We successfully restored a mile of Resurrection Creek to a more natural condition; improving stream channel and aquatic habitat conditions that benefit coho, pink, chum, and Chinook salmon as well as other wildlife.

We began collaborating with Hope Mining Company in 2005 to develop a framework for restoring additional segments of Resurrection Creek. The framework included a segment of the creek overlaid by federal mining claims owned by Hope Mining Company, located two miles upstream from the mouth of Resurrection Creek at Turnagain Arm near the town of Hope, Alaska. We reached an agreement with Hope Mining Company in December of 2007 on ways to restore the creek in conjunction with future mining plans. The 2007 Agreement included a 74 acre, two-mile long stream restoration corridor, where most existing mining activities would be eliminated; building a temporary bridge for restoration access; and replacing the pond and ditch systems and mining access routes that restoration activities would obliterate within the proposed corridor. Based on the 2007 Agreement, Hope Mining Company submitted a plan of operations to us in 2007. Hope Mining Company has since amended their 2007 proposed plan of operations to incorporate changes in mining methodology, infrastructure, and scope of proposed mining areas.

Our proposed action (alternative 2) would allow future authorization of mining operations on 274 acres and associated infrastructure outside of the restoration corridor. Restoration would include lengthening Resurrection Creek's channel from 2.2 to 2.7 miles by adding sinuosity to the channel, restoring floodplains, and encouraging streamside vegetation within the 74 acre, two-mile long restoration corridor (see maps in appendix A).

Decision

Based on my review of the Final Environmental Impact Statement, I am selecting alternative 2 which includes proposed placer mining operations and restoration of Resurrection Creek. A detailed description of this alternative is included in the Final Environmental Impact Statement (USDA Forest Service, Chugach National Forest 2015; pages 26-32). I have summarized alternative 2 here.

Proposed Mining

- This alternative would allow future authorization of placer mining operations on 274 acres located outside of the restoration corridor along Resurrection Creek. Mining operations would include mechanized mining, hand mining and dredging over an expected 20 year time frame; constructing new and using existing mining infrastructure such as mining camps, settling ponds and ditches, and mining access routes. We would approve individual mining operations when Hope Mining Company 1) submits adequate information describing scope of the individual mining operations including equipment and infrastructure to be used and 2) provides financial assurance (bonding) for required reclamation.
- Based on the slope stability analysis in area 20 (USDA Forest Service, Chugach National Forest 2015, page 76), I am changing a proposed mining access route along the top of the terrace in area 20 just north of camp 1 that is described in the Final Environmental Impact Statement as a road to an ATV trail. The ATV trail would be constructed to a width of 5 feet or less, approximately 500 feet in length, with 2 feet of vegetation clearing allowed on either side, for access into area 20 from camp 1. This ATV route would include building a bridge suitable for an ATV to cross a small drainage just north of Camp 1 because a culvert would not be approved for this location. This change is displayed on the mining infrastructure map in appendix A.
- Reclamation requirements, as specified in the individual plans of operations would vary depending on the specific operation, ground to be mined, and site specific conditions.

We would approve a Hope Mining Company supplement to exclude mining activities within the restoration corridor that overlays their existing mining operations described in the 1986, 1988, 1999, and 2010 approved plans of operations. This supplement would also describe specific mining infrastructure (ponds, roads, ditches) currently located adjacent to Resurrection Creek that would be replaced in-kind, outside the restoration corridor boundary, by the Forest Service (see mining infrastructure map in appendix A).

Restoring Resurrection Creek

- Alternative 2 would allow us to establish a 74 acre restoration corridor along Resurrection Creek.
- We would construct a meandering river channel within the corridor approximately 2.7 miles in length with side channels that resemble natural conditions and reestablish a self-sustaining riparian ecosystem.
- We would use beetle killed spruce and other trees for stream bank protection within the project area, which would create and improve fish and wildlife habitat and floodplain stabilization.
- We would place nutrient-rich, weed-free soils and organics on the newly constructed floodplains and riparian areas to improve growing conditions for native plant communities.
- We would revegetate constructed floodplains and riparian areas through natural revegetation and planting native plant species.
- We would construct a temporary bridge over Resurrection Creek to use for restoration activities and monitoring after implementation. How long the bridge is used depends on availability and timing of restoration funding and Hope Mining Company's plans to complete their mining within the restoration corridor before we begin the restoration. We anticipate restoration to take about 4 years total. However, it may be split into several implementation periods based on available funding. We will continue to use the bridge for about 5 years post-implementation to monitor key elements of the restoration work.

I have attached three appendices to this Record of Decision to further clarify my decision.

Appendix A: Vicinity map and project area maps.

Appendix B: Mitigation measures and monitoring activities are a component of this decision. Mitigation measures are intended to avoid and reduce impacts during project implementation as described in the Final Environmental Impact Statement.

Appendix C: Outlines the permits required for implementing both restoration and mining activities. We would be required to obtain permits to implement restoration activities and Hope Mining Company would be required to obtain various permits for mining operations.

Rationale for the Decision

In selecting alternative 2, I considered the following factors in my decision:

Purpose and need for the project is best met through implementing alternative 2

The purpose and need for the project has two key elements:

1. Processing Hope Mining Company's proposed plan of operations, and
2. Creating a more natural and complex stream channel structure, restoring floodplain connectivity with the stream, and improving aquatic and riparian habitat along 2.2 miles of Resurrection Creek.

I recognize that this project is unique because it combines mining and stream restoration where these two objectives could be in conflict. I appreciate the interest, patience and persistence that Hope Mining Company representatives and our Forest Service resource specialists have had to dialogue, listen to each other, and create a mutually beneficial project. The five year time period between release of the Draft and Final Environmental Impact Statements involved addressing substantive comments provided by the public and Hope Mining Company and addressing changes in mining methodology. Our Forest Service specialists worked with Hope Mining Company representatives and members of the public to incorporate changes, where possible, to the alternatives; and to more thoroughly analyze the effects of the activities on resources and the nearby private landowners.

Alternative 2 incorporates a design that is mutually beneficial to both the mining operator and for stream restoration and provides a strategic plan for implementation. I listened to Hope Mining Company's concerns and believe we have generated the flexibility for mining operations that is critical to Hope Mining Company's business plan and operations. Our planned restoration will also create long-term improvements in the quality of the resources along Resurrection Creek.

Mining statutory and regulatory requirements are met

In alternative 2 we recognize the statutory right of Hope Mining Company to enter upon public lands to search for minerals, conferred by United States mining laws as codified in Forest Service regulations (36 CFR 228A). It is our obligation to approve or require modification to the terms and conditions for any proposed plan for additional requirements for surface resource protection.

My decision does not modify previously approved plans of operations. I recognize that previous plans have a complicated legal history and that Hope Mining Company has specifically noted that their proposed plan of operations will not change or affect their previous plans nor require/trigger a new modification/approval process. The only exception is a supplement to Hope Mining Company's previous plans of operations that Hope Mining Company would voluntarily submit to exclude mining activities from within the restoration corridor. The supplement would need to be submitted to and approved by us before we begin any restoration activities.

Forest Plan goals and objectives are best achieved through alternative 2

Alternative 2 best meets the goals and objectives of the Chugach National Forest Revised Land and Resource Management Plan (Forest Plan) and is consistent with the direction it provides.

- Providing opportunities to develop minerals for commercial uses and providing exploration and development opportunities in areas with moderate to high locatable mineral potential (USDA Forest Service, Chugach National Forest 2002a, page 3-6).
- Reestablishing proper functioning streams and riparian areas (USDA Forest Service, Chugach National Forest 2002a, page 3-2) by returning stream systems and riparian areas towards the historic range of variability.

- Maintaining and restoring water quality (USDA Forest Service, Chugach National Forest 2002a, page 3-3) by reconnecting a more natural, complex channel to a functioning, restored flood plain and provide a buffer between mining operations and infrastructure and the reconstructed stream channel.
- Improving soil conditions where degradation has occurred (USDA Forest Service, Chugach National Forest 2002a, page 3-2) by reestablishing top soil in the restoration corridor.
- Restoring natural ecological processes and flora native to the area (USDA Forest Service, Chugach National Forest 2002a, page 3-3) in shorter time periods than would occur without intervention.
- Maintaining habitat to produce and sustain fish and wildlife populations (USDA Forest Service, Chugach National Forest 2002a, page 3-4) by restoring a more natural ecological system within the restoration corridor.
- Maintaining habitat to produce viable and sustainable fish and wildlife populations that support use of fish and wildlife resources for subsistence purposes (USDA Forest Service, Chugach National Forest 2002a, page 3-4, 3-13).

Project impact to adjacent private landowners

I recognize that mining activities on National Forest System lands could affect adjacent private landowners through equipment noise, removal of vegetation which could further amplify noise to landowner property and negatively affect scenic quality, and day-to-day activities associated with vehicles and construction and utilization of mining infrastructure on mining claims. I heard the concern of private landowners that adjacent mining operations might affect water quality in their wells and affect their private property values.

The following are key factors I considered:

- The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for locatable minerals on federal public lands. Under this Act, Hope Mining Company has the right to access locatable minerals on their claims. I cannot deny reasonable access to the mineral estate by requiring vegetative buffers along boundaries, specifying hours of operations, or requiring they mine elsewhere.
- My staff and Hope Mining Company have discussed the concerns raised by land owners during the Draft Environmental Impact Statement public comment period. As a result, one proposed mining road in area 21 was moved farther from the private land boundary. Hope Mining Company also agreed to reduce the width of the proposed road in area 16a from 14 feet to 8 to 10 feet wide, reducing the potential for erosion of the adjacent steep slope. The purpose of the proposed road in area 16a is for accessing the northern part of the mining areas and for maintaining the water pipeline proposed in area 16a. Hope Mining Company also agreed to gate either end of this road to minimize the amount of mining traffic on the road, which partially addresses landowner concerns (USDA Forest Service, Chugach National Forest 2015, pages 75 and 156).
- My staff analyzed the potential effects of mining activities on private wells and found that water table elevations would only be compromised if water was taken out of the Resurrection Creek system through out-of-basin diversions or if enough impervious surfaces were constructed to prevent runoff from percolating back into the ground and replenishing groundwater resources. Mining activities would use surface water from small streams from the adjacent slopes on either side of Resurrection Creek and then let that water infiltrate back into the ground through use of settling ponds constructed outside the restoration corridor. A majority of the water used for mining will soak back into the

ground, thereby protecting the integrity of the groundwater in the area (USDA Forest Service, Chugach National Forest 2015, page 101).

- I understand the concern about the perceived or real loss of private property values. Private landowners have the opportunity and responsibility to research and purchase based on adjacent land uses. The mining claims adjacent to private property have been in place from 1983 to 1988 and the earliest claims within the project area date back to 1895 through the early 1900s.Whether or not a mining claim will be developed is not within my decision authority.

I also recognize that equipment noise may affect adjacent private landowners during stream channel reconstruction and floodplain restoration (USDA Forest Service, Chugach National Forest 2015, pages 88-89).

Project impact to heritage resources

The Hope Mining Company Historic Mining District would be affected by redistribution of historic tailings piles from the hydraulic mining era. Historic tailings are a contributing feature of the historic mining district and redistributing this material is an unavoidable adverse effect to the historic mining district. Our archeologist consulted with the State Historic Preservation Officer and executed a Memorandum of Agreement in 2009 addressing adverse effects of mining and restoration on these tailings. We agreed to mitigate the adverse effects by developing an interpretive area which will be located on the south end of the project, accessible from Resurrection Creek Road. We will partner with Hope Mining Company in developing the interpretive area and interpretive signing for a representative section of intact historic mine tailings (USDA Forest Service, Chugach National Forest 2015, page 129).

A historic mining dragline is located within the restoration corridor. In the public scoping comment period in 2008, a number of individuals questioned the disposition of the drag line. Prior to restoration, we would coordinate with Hope Mining Company to move the dragline equipment to a location within the boundaries of the Historic Mining District where it won’t be damaged by restoration or mining activities (mitigation 10). This historic mining equipment is listed as a contributing feature of the Hope Mining Company Historic Mining District and the State Historic Preservation Officer concurred with our finding that since the dragline was designed to be mobile, its relocation within the Historic Mining District will result in no adverse effect to the equipment or to the Hope Mining Company Historic Mining District.

Project impacts to the Resurrection Inventoried Roadless Area

I considered the impacts of mining and restoration activities on roadless characteristics within the Resurrection Inventoried Roadless Area. Approximately 147 acres of the 418 acre project area are in the Resurrection Inventoried Roadless Area and would include the following activities:

- Placer mining on 125 acres of the 147 acres including the removal of trees over the entire acreage
- Constructing approximately 0.73 miles of temporary road by Hope Mining Company for access
- Relocating approximately 0.12 miles of mining roads outside the restoration corridor by the Forest Service to replace mining access roads that will be obliterated by restoration work
- Harvesting approximately 750 spruce and hemlock trees on the same 125 acres of placer mining areas (prior to mining) to use during restoration
- Redistributing the hydraulic mine tailings, creating a new, more sinuous main channel and side channels; and using trees to construct log jams for streambank stability, fish hiding cover structures

and flood plain "roughness" on about 4 acres of restoration corridor within the inventoried roadless area

Proposed road building and tree harvesting within inventoried roadless areas fall under the Chief of the Forest Service's review process of May 31, 2012. I requested and received redelegated authority on July 2, 2014 from the Chief of the Forest Service to make this National Environmental Policy Act decision concerning road building and tree harvesting as described in alternative 2.

Road construction for mining access and tree harvest associated with this project is exempt from the prohibitions under the 2001 Roadless Area Conservation Rule (36 CFR 294.12(b)(3)) because of Hope Mining Company's rights to the locatable mineral estate under U.S. Mining Laws.

The Forest Service as an agency has limited discretionary authority over development of locatable minerals. The right to explore and develop locatable minerals, including right of access, is based on the U.S. Mining Laws and the General Mining Act of May 10, 1872, as amended, and codified in 36 CFR 228A.

Tree harvesting for restoration activities within the inventoried roadless area may also be allowed under the 2001 Roadless Area Conservation Rule (36 CFR 294.13 (b)(2)) because the cutting and removal of trees is incidental to the implementation of a management action not otherwise prohibited by the rule.

Climate change

I considered the potential effects of climate change on the riparian ecosystem within the project area. Changing climate is likely to increase the magnitude of peak flows in Resurrection Creek as a result of changes in precipitation, snowmelt, and weather patterns. Restoration activities in alternative 2 would reconstruct the stream channel, floodplains, and riparian areas to accommodate and dissipate the energy of flood flows and improve the resiliency of the system to floods, which would not occur under alternative 3. The restored channel would be semidynamic, allowing the channel to change under natural processes as it constantly adjusts to changing environmental conditions (USDA Forest Service, Chugach National Forest 2015, page 68).

Public and agency comments

Some specific comments we received during the Draft Environmental Impact Statement public comment period that I considered in this decision are as follows:

- One comment submitted included a desire for public access across the temporary bridge to the west side of Resurrection Creek and creation of a new trail on the west side of Resurrection Creek that would link Resurrection Pass and Gull Rock Trails. The Resurrection Pass Trail bridge already serves the purpose of providing pedestrian access to the west side of Resurrection Creek. The temporary bridge is for access for restoration activities and mining access as authorized. Creating a new trail on the west side of Resurrection Creek is beyond the scope of this project (USDA Forest Service, Chugach National Forest 2015, page 218).
- Effects of mining on scenic quality were mentioned in numerous comments. I recognize mining activity will continue to produce visual conditions that have an "unacceptably low" scenic integrity level during active operations. Reclaimed mining areas will meet the minimum scenery integrity objective of "very low" in the short term (1 to 5 years). As vegetation becomes reestablished on the sites it will, over time, mask visible signs of previous mining activity. The "very low" scenic integrity

level meets the minimum level in the Forest Plan direction for the Minerals Management Area prescription (USDA Forest Service, Chugach National Forest 2002a, page 4-86). Monitoring vegetation recovery will occur on the reclaimed areas (monitoring activity 9, appendix B).

- The National Marine Fisheries Service provided comments on monitoring project implementation and included a recommendation that the juvenile salmon age study completed by Blanchet and Wenger in 1993 be repeated after project completion. Further discussion with National Marine Fisheries Service staff in September of 2014 clarified that National Marine Fisheries Service intent was to support the restoration project even if the 1993 juvenile salmon study was not repeated (USDA Forest Service, Chugach National Forest 2015, pages 215 and 219.

Other considerations

- I have considered that all but 4 acres of the 418 acre project area are included as part of a patent application that has been submitted to BLM but has not been processed due to the 1994 patent moratorium on spending appropriated funds for the acceptance or processing of mineral patent applications. I understand that each claim or any number of fractional portions of the claims could be conveyed to Hope Mining Company based on any existing mineral deposits and demonstration of a profitable economic analysis at the time of a patent examination process. The status of the patent moratorium has remained unchanged for the past 20 years and it would be speculation on my part that any mining claims or fractional parts would be conveyed to Hope Mining Company as a patented mining claim. Therefore I am willing to include restoration activities as part of this decision.
- The northern half of the project area is selected by the State of Alaska for conveyance under Section 6 (a) of the Alaska Statehood Act (Public Law 85-508). I have weighed the financial cost of restoration activities with the possibility that this portion of the project area could be transferred out of the National Forest System lands. Title to the lands where federal mining claims exist would not transfer to the state if the mining claimant was determined to possess valid and existing rights. Although transferring these lands to the State of Alaska in the future is a possibility and could result in development of these lands, the resources would still be protected by the State of Alaska's laws and statutes regarding development in floodplains and along salmon-bearing waters. In response to this consideration, we developed an alternative that excluded restoration activities from State selected lands. However, transfer of these lands would not affect the longevity of the proposed restoration because of the protections afforded by state regulations. Therefore, this alternative was dropped from further consideration (USDA Forest Service, Chugach National Forest 2015, page 54)
- We received comments during both the public scoping period and the public comment period for the Draft Environmental Impact Statement that the proposed temporary bridge would enable Hope Mining Company to more easily mine on the west side of Resurrection Creek. I acknowledge that the temporary bridge provides mutual benefits to both the Forest Service and Hope Mining Company. The bridge is temporary and will be removed when restoration implementation and monitoring are completed. Hope Mining Company is currently authorized to build a bridge per their approved 1999 plan of operations. Mining activities are already occurring on the west side of Resurrection Creek as approved by existing plans of operations.
- I recognize that implementation of restoration activities will require close coordination with Hope Mining Company. We may allocate funding for restoration within one or more fiscal years and we will time implementation of restoration contracts in coordination with Hope Mining Company's mining plans for the remaining unmined part of the restoration corridor. Hope Mining Company may opt to mine the sections of abandoned creek bed within the restoration corridor prior to flood plain

and side channel restoration activities. If funding for restoration is delayed or not available, Hope Mining Company may still proceed with their proposed mining activities as described in alternative 2.

- I recognize the legal sensitivity of restoration work occurring on mining claims. Both the Forest Service and Hope Mining Company would ensure that before restoration begins, a legal document would be in place that protects the interests of both parties.
- Hope Mining Company would continue to hold the mining claims that overlay the restoration corridor. Hope Mining Company or a future mining claimant could still propose future mining operations in the restored area although it is unlikely that an economically extractable amount of gold would remain in the mined areas of the restoration corridor. Any future mining operations would be evaluated and an approval would minimize adverse environmental impacts to the restoration corridor. The mining operator would need to provide financial assurance (bonding) to ensure that the area would be reclaimed to the current restored condition.

Significant Issues

The interdisciplinary team identified two significant environmental issues during scoping which were further analyzed and refined as part of the Draft Environmental Impact Statement and Final Environmental Impact Statement disclosures:

Increased turbidity in Resurrection Creek from stream restoration activities would impact water quality

Impacts to water quality are described by the amount of turbidity found in the water compared to the natural level of turbidity in the creek. Impacts to water quality from restoration activities were considered an issue because of the likelihood of exceeding Alaska Department of Environmental Conservation water quality standards. For Resurrection Creek, the water quality standards are no more than 25 nephelometric turbidity units (NTU) above background conditions within the creek. This standard is specified to conserve the growth and propagation of fish, shellfish, and other aquatic life within Resurrection Creek.

During restoration, a short, controlled turbidity pulse of over 300 NTU above background conditions would occur each time a segment of the creek is diverted into a newly constructed channel meander. A total of six to ten turbidity pulses would be spread over a period of three or more years (pending funding availability) and would occur in the May 15 to July 15 Alaska Department of Fish and Game instream construction window. Turbidity levels immediately downstream of the diversion site are likely to exceed 300 NTU for up to 30 minutes during each diversion to a new channel meander, returning quickly to normal levels. Turbidity levels would decrease with distance from the diversion site as particles settle out of suspension. The highest turbidities would occur within one mile downstream of the diversion site, but moderate turbidity levels (up to 150 NTU) would be expected after each diversion for up to 1 hour all the way to the mouth of Resurrection Creek.

Smaller, more frequent pulses of turbidity would also occur during other in-stream restoration activities such as modifications to the channel cross-section (shaping the banks), logjam construction, side-channel construction, filling the replaced channel segments, equipment crossings, and bridge construction. Groundwater seepage into the newly constructed channels is likely to cause increased turbidity. These turbidity pulses would quickly decrease to background levels shortly after equipment use stops (within 30 minutes). Up to 10 small pulses of turbidity per day (if equipment is working in the channel) of up to 150 NTU may occur up to one mile below the work site with reductions to below 25 NTU further downstream toward the mouth of Resurrection Creek.

Turbidity of the magnitude described above may have an indirect effect on aquatic species but the impacts to fish would be minimized because all the fish species are outside of their susceptible early life stages (egg to fry) during the May 15 to July 15 time period.

The effects on water quality from restoration activities have been minimized in the following ways:

- Using the Alaska Department of Fish and Game instream construction window (May 15 – July 15) (mitigation measure 2, appendix B).
- Constructing the new channel and side channels "in the dry" prior to diverting creek water (mitigation measure 7, appendix B).
- Constructing the new channel with stability design features (log jams, large boulders, lower gradient and more sinuosity) which lowers turbidity more quickly after water is diverted into the new channel and minimizes the risk of dynamic channel changes over the long term.
- Minimizing the number of creek crossings per day by restoration equipment, and ensuring new creek crossings are built following best management practices to reduce turbidity (mitigation measures 2 and 5, appendix B).

Mining activities should not impact water quality because the operator is required to meet Alaska Department of Environmental Conservation water quality standards and permit requirements for discharge of any processed water into Resurrection Creek during mining operations. Mitigation measures 1, 4, 5, 8, and 25-28 also address potential erosion of soil, fuel storage and other activities that could affect water quality.

Detrimental soil disturbance from mining activities and restoration

The Forest Service Manual defines soil productivity as the inherent capacity of a soil to support the growth of specific plant communities (USDA Forest Service 2010, FSM 2554.05-13). Soil productivity is inversely related to detrimental soil disturbance. Soil productivity is maintained by minimizing detrimental soil disturbance. Forest Service detrimental soil conditions monitoring guidelines are used as the analysis tool to compare effects of the alternatives and determine significant effects on soil productivity (USDA Forest Service, Alaska Region 2006, Soil Quality Monitoring, FSM 2554.05-13). If loss of soil productivity for any activity area is greater than 15 percent, it is considered significant.

Both alternative 2 and 3 would result in a significant adverse effect to soil productivity. Alternative 2 has a total detrimental soil disturbance of 58 acres or 17 percent of the 348 acre restoration and mining activity area. Alternative 3 has a total detrimental soil disturbance of about 58 acres or 20 percent of the 285 acre mining activity area. Mitigation measures 1, 3, 4, 6, 15-17, and 27 (appendix B) have been designed to minimize detrimental soil disturbance from both restoration and mining activities.

Alternative 2 and its mitigation measures meet the forestwide standards for soils in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-22 and 3-23) through implementing best management practices specified in the Soil and Water Conservation Handbook (USDA Forest Service, Alaska Region 2006, FSH 2509.22), conducting a landslide risk analysis on steep slopes for situations prescribed by the Forest Plan, and evaluating soil stability and potential soil mass wasting.

Based on the slope stability analysis in area 20 (USDA Forest Service, Chugach National Forest 2015, page 76), I am changing a proposed mining road along the top of the terrace in area 20 just north of Camp 1 to an ATV trail. The route that was proposed is on a narrow strip (56 feet at the narrowest) between the very steep (60 percent) slope and Resurrection Creek Road. The soils in this location are deep,

unconsolidated sands and gravels prone to erosion when bare of vegetation. The road width and combined vegetation clearing widths on either side would require removing nearly all the vegetation between Resurrection Creek road and the steep slope break. Changing from a road to a narrower ATV trail would lower the risk of erosion during construction and use of this route. The route also crosses a small, deep drainage that begins at a culvert on Resurrection Creek Road. There is a risk that a new culvert could plug or fail which would divert and concentrate flow from the existing Resurrection Creek Road and the new road segment, saturating soils and potentially overloading the very steep slope below. The result could be a landslide or slump into the restored floodplain, potentially compromising Resurrection Creek Road and damaging any restored stream segments. Hope Mining Company has indicated this route is needed for ATV access from camp 1 into area 20. For these reasons the decision includes approval of an ATV trail (not more than 5 feet wide with 2 feet of vegetation clearing on either side) to be constructed from camp 1 for approximately 500 feet in length for access into area 20. This ATV route would include building a bridge suitable for an ATV to cross the small drainage; a culvert would not be approved for this location. This change is displayed on the mining infrastructure map in appendix A.

Public Involvement

We published a notice of intent to prepare an Environmental Impact Statement in the Federal Register on January 28, 2008. We listed the proposed action in the Chugach National Forest Schedule of Proposed Actions and updated it periodically during the environmental analysis. We sent a scoping letter to the public on January 4, 2008, and accepted public comments until February 21, 2008. We held public meetings on February 12, 2008 in Hope, Alaska with 9 community members attending and on February 13, 2008 in Anchorage, Alaska with 7 Anchorage residents attending. We held an informative public meeting on June 13, 2009 in Hope, Alaska with a site visit to the project area in which 18 members of the public attended. We received 13 written comments during this scoping period.

At the request of the Alaska Center for the Environment, we met with one of their employees and with a local resident on August 14, 2009 to discuss the Phase I restoration work and the proposed Phase II project. The group visited the Phase I project area and then met with Hope Mining Company to look at existing mining and the proposed restoration corridor.

In developing the Draft Environmental Impact Statement, our staff had frequent meetings with Hope Mining Company representatives to discuss specific elements of the proposed mining activities including quarterly status update meetings. These meetings have included the District Ranger, Forest Supervisor, and Interdisciplinary Team members to clarify, define and update the proposed mining plan of operations as we identified concerns and shared new information.

The Draft Environmental Impact Statement lists agencies, organizations, and people who received copies of the document (USDA Forest Service, Chugach National Forest 2010, pages 150 to 151). We identified two significant environmental issues which we used to determine the scope of the analysis. We have included a full description of issues and concerns identified and addressed as part of the Draft Environmental Impact Statement in the Final Environmental Impact Statement (USDA Forest Service, Chugach National Forest 2015, pages 21 to 22).

We published a Draft Environmental Impact Statement for review and comment on July 23, 2010. We received a total of 18 comments: 12 comment letters from members of the public, 2 comment letters from organizations, 3 comment letters from other federal agencies and a letter from the Hope Mining Company. We synthesized these comments and have responded to them in appendix D of the Final Environmental Impact Statement (USDA Forest Service, Chugach National Forest 2015, pages 217 to 264).

We met with a representative from Alaska Center for the Environment and two private landowners on the project area on August 10, 2010 to discuss proposed mining activities and potential effects to adjacent private property. That evening we held a public meeting in Hope to show the background of the project, summarizing the key points of the Draft Environmental Impact Statement. Four people attended the meeting.

We held a meeting on August 11, 2010 at the Residence Inn in Anchorage to discuss the Draft Environmental Impact Statement. Five people attended the meeting.

We sent a letter to interested members of the public and agencies on June 15, 2012 to notify the public of a June 29, 2012 meeting in Hope, Alaska, to update interested members of the public on the status of the project and answer questions. Six people attended the meeting.

Other Alternatives Considered in Detail

In addition to the selected alternative, I considered two other alternatives that were analyzed in detail; those two alternatives are discussed below. A more detailed comparison of these alternatives and a description of the alternatives considered but eliminated from detailed study can be found in the Final Environmental Impact Statement (USDA Forest Service, Chugach National Forest 2015, pages 26 to 35, 54 to 55). Alternative 2, the selected alternative, is the environmentally preferred alternative. Chapter 2 in the Final Environmental Impact Statement provides a summary comparing effects between alternatives that supports this finding (USDA Forest Service, Chugach National Forest 2015, pages 56 to 63).

Alternative 1 – No Action (Existing Approved Mining)

We have a regulatory obligation to approve or require modifications to any proposed plan of operations (36 CFR 228.5); therefore I cannot select alternative 1 because taking no action would not fulfill this regulatory requirement. Our analysis of the no-action alternative provided a means to compare the effects of other alternatives with the effects of implementing the existing mining plan of operations.

Alternative 1 incorporates continued implementation of the current approved mining plans of operations with no new areas considered for mining. No restoration activities would occur along Resurrection Creek. Mining would continue to occur in the existing approved areas, estimated at 10-15 years. All mining areas and infrastructure (roads, ditches/ponds, and camps) would be fully reclaimed after mining activities were complete.

Alternative 3 – Proposed Mining Operations Only

We have a regulatory obligation to approve or require modifications to the terms and conditions of the proposed plan of operations submitted by Hope Mining Company (36 CFR 228.5); irrespective of whether any restoration of Resurrection Creek occurs. We developed Alternative 3 to analyze the effects of proposed mining operations without restoration.

Under alternative 3, no restoration corridor would be established and no stream or riparian restoration activities would occur in or adjacent to Resurrection Creek. Mining operations would continue to occur along either side of Resurrection Creek in 285 acres of new mining areas. Mining area boundaries for alternative 3 adjacent to Resurrection Creek are defined by a 20-foot wide vegetative buffer zone along the creek as has been required in the previous approved plans of operations. Some additional acres are proposed for mining in the area between the 20-foot wide buffer and the restoration corridor described in

alternative 2, and for this reason, there are 11 more acres proposed for mining in alternative 3 than in alternative 2. Alternative 3 would meet the statutory requirement of processing the mining plan of operations but does not meet the second part of the purpose and need which is to create a more natural and complex stream channel structure within Resurrection Creek and restore floodplain connectivity and improve fish and wildlife habitat within the riparian area.

Forest Plan Consistency

This decision is consistent with the Chugach National Forest Revised Land and Resource Management Plan (Forest Plan), as amended (USDA Forest Service, Chugach National Forest 2002a). Alternative 2 conforms to Forest Plan standards and incorporates applicable Forest Plan direction for the following resources:

Air Quality: - The proposed activities in alternative 2 comply with state standards for visible and particulate air quality per Forest Plan standard (USDA Forest Service, Chugach National Forest 2002a, page 3-22).

Soils – Alternative 2 implements best management practices specified in the Soil and Water Conservation Handbook (USDA Forest Service, Alaska Region, 2006, FSH 2509.22) through design criteria and mitigation measures. The soils effects analysis includes a landslide risk analysis on steep slopes for situations prescribed by the Forest Plan, and evaluates soil stability and potential soil mass wasting (USDA Forest Service, Chugach National Forest 2002a, pages 3-22 and 3-23).

Aquatic Resources and Hydrology: Alternative 2 is consistent with the Forest Plan general wildlife guideline (which includes fish) by restricting restoration work to the instream construction window designated by Alaska Department of Fish and Game which protects salmon from effects of instream work during their sensitive season (spawning) (USDA Forest Service, Chugach National Forest 2002a, page 3-28).

Vegetation Ecology: Alternative 2 meets Forest Plan guidelines of utilizing natural revegetation methods where feasible and incorporating invasive plant prevention and control features (USDA Forest Service, Chugach National Forest 2002a, page 3-25).

Wildlife Habitat: Mining operators and restoration contractors are required to remove garbage and store food in compliance with the standard to prevent habituation of wildlife (Forest Plan, page 3-28). The wildlife effects analysis included evaluation of the project area for threatened or endangered species habitat or species (USDA Forest Service, Chugach National Forest 2002a, page 3- 33) and included analysis for sensitive species.

Heritage Resources**:** Site surveys were completed to determine effects to heritage resources when surface or subsurface activities disturb more than one square meter of ground or when this ground disturbance occurs in areas of known heritage resources, sites, or districts on, or eligible for the National Register of Historic Places (USDA Forest Service, Chugach National Forest 2002a, page 3-34).

Recreation**:** The proposed mining and restoration activities meet the recreation opportunity spectrum class mapped for the project area as defined by the standard for recreation and tourism (Forest Plan, page 3-35) and proposed activities also meet the guideline ensuring the levels of use and development are consistent with recreation opportunity spectrum class characteristics (USDA Forest Service, Chugach National Forest 2002a, pages 3-35 – 3-40).

Scenery Resources: The proposed activities and their effects on scenery resources meet the scenic integrity objectives as defined by Forest Plan standard (USDA Forest Service, Chugach National Forest 2002a, pages 3-35 – 3-36).

Inventoried Roadless Area: Alternative 2 is consistent with the Forest Plan Record of Decision which states that inventoried roadless areas within the Forest will be managed consistent with all interim direction and the final roadless rule (USDA Forest Service, Chugach National Forest 2002c, page25). Alternative 2 is consistent with the 2001 Roadless Rule and the Chief of the Forest Service redelegated National Environmental Policy Act based decision authority to me on July 2, 2014 for approving road building and tree harvesting activities within the Resurrection Inventoried Roadless Area as are described in the Final Environmental Impact Statement (USDA Forest Service, Chugach National Forest 2015, page 150).

Subsistence Resources: The proposed activities do not adversely affect access for subsistence activities as specified by Forest plan standards (USDA Forest Service, Chugach National Forest 2002a, pages 3-41 and 3-42).

Findings Required by Law

General Mining Act of May 10, 1872, as amended

The General Mining Act of 1872, as amended, confers a statutory right upon a mining claimant to enter upon public lands to prospect, develop and mine valuable minerals. This decision provides Hope Mining Company reasonable access to their mining claims to carry out mining operations in the project area.

Organic Administration Act of 1897

The Organic Administration Act authorizes the Secretary of Agriculture to establish regulations to govern the occupancy and use of National Forests and to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows. The decision documents use of design criteria and mitigation measures which minimize, where feasible, environmental impacts without materially interfering with a mining claimant's rights under the General Mining Act of May 10, 1872, as amended.

Multiple Surface Use Act of 1955

Hope Mining Company has the right to occupy lands on their mining claims and any other lands open to mineral entry; 274 acres have been analyzed and made available for future authorization for mining activities. Uses must be reasonably incidental and would include prospecting, mining, mineral processing, use of timber and common variety minerals when used in support of the mining operation, and any necessary clearing of timber.

The Multiple-Use Sustained-Yield Act (1960)

The restoration activities within the decision meet the intent of the Multiple Use-Sustained Yield Act to administer the renewable resources of water, recreation and wildlife on the national forests for multiple use and sustained yield of the products and services.

The National Historic Preservation Act (1966)

The Forest Service analyzed the effects of restoration and mining operations on the historic resources and developed a Memorandum of Agreement in 2009 with the State Historic Preservation Officer to mitigate the adverse effect of redistributing the historic tailing piles, a contributing feature of the Hope Mining Company Historic Mining District.

The National Environmental Policy Act (1970)

The environmental analysis for this project utilized a systematic and interdisciplinary approach to incorporate natural and social sciences and environmental values into the decision making processes by considering the environmental impacts of the proposed action and reasonable alternatives to that action.

Clean Air Act (1970, as amended 1977, 1990, 2004)

Implementation of restoration and approval of mining operations will comply with Clean Air Act. Emissions are not anticipated to exceed the Alaska Department of Environmental Conservation air quality standards. Water trucks will provide for dust abatement during dry conditions when large equipment or large trucks related to restoration are making multiple daily trips on Resurrection Creek Road.

Clean Water Act (1972)

All stream restoration work and mining operations would follow applicable State and Federal permitting requirements, including the regulations under the Clean Water Act Section 404 for dredge and fill within wetlands and the Clean Water Act Section 401 for compliance with water quality standards.

Endangered Species Act (1973)

No threatened or endangered species or designated critical habitat for animals or plants exists within the project area.

Safe Drinking Water Act (1974, as amended 1986, 1996)

The Forest Service is required to protect source watersheds and Resurrection Creek has been identified as a source watershed for one business in Hope which has a public water system determined by Alaska Department of Environmental Conservation to be using groundwater under the direct influence of surface water from Resurrection Creek. Mitigation measures for appropriate fuel storage and separation distances for septic systems from surface water will be required for restoration and mining activities to protect water quality.

Magnuson-Stevens Fishery Conservation and Management Act (1976, as amended through 1996)

Restoration activities may adversely affect essential fish habitat in the short term (1 to 4 years), therefore formal consultation with National Oceanic and Atmospheric Administration has been conducted. The long-term indirect and cumulative effects of implementing this project would be the restoration of riparian vegetation, increased spawning substrate, increased pool habitat, and increased perennial side channel flows and associated over-wintering habitat, which would improve aquatic habitat quantity and quality for fish populations and aquatic invertebrates. Aquatic vertebrate and invertebrate populations should respond

positively to the stream channel and riparian rehabilitation. Increased spawning and rearing habitat should provide a long-term benefit to the aquatic ecosystem and the fisheries resources for the foreseeable future.

Executive Order 11988 - Floodplain Management (1977)

Stream restoration will maintain and restore water quality by re-connecting a more natural, complex channel to a functioning, restored flood plain. This will reduce erosive energy of high flow events and provide a buffer between mining operations and infrastructure and the reconstructed stream channel.

Executive Order 11990 - Protection of Wetlands (1977)

Approximately 19 acres of mapped wetlands exist within the Resurrection Creek project area; all wetlands are within the Resurrection Creek channel or immediately adjacent to it. Mining settling ponds within the valley floor are not considered jurisdictional wetlands because they are approved infrastructure for mining purposes and can alter in size and location as needed for mining operations.

In implementing alternative 2, wetlands will be reconfigured and redistributed, with a net gain of about 7 acres. Much of the existing wetlands will be filled and reconstructed within the restoration corridor. Conceptual designs estimate that wetland areas will increase in area by up to 7 acres resulting in a total of 26 acres and would be of higher quality than what exists currently. These 26 acres would include the main stem of Resurrection Creek, which would be constructed as a meandering and dynamic channel, as well as side channels and off channel wetlands which do not currently exist. Alternative 2 would be a net benefit to wetland resources in terms of quantity and quality over the existing condition.

Alaska National Interest Lands Conservation Act (1980)

An Alaska National Interest Lands Conservation Act Section 810 analysis was conducted and disclosed in the Final Environmental Impact Statement (USDA Forest Service, Chugach National Forest, 2015, pages 153-160). Restoration and mining activities will not have a detrimental effect on subsistence use of the project area or the Resurrection Creek watershed.

Executive Order 12962 - Recreational Fisheries (1995)

Restoration and mining activities will not change access to recreational fishing opportunities.

Executive Order 13112 - Invasive Species (1999)

Known populations of invasive species include a fairly high concentration of common dandelion (*Taraxacum officinale*), populations of narrowleaf hawksbeard (*Crepis tectorum*), and scentless false mayweed (*Triplospermum perforata*); and are found along access roads on the east side of Resurrection Creek. Oxeye daisy (*Leucanthemum vulgare*) is found scattered on both sides of the creek. Other nonnative species include *Linaria vulgaris* (butter and eggs), white and red clover (*Trifolium repens* and *T. pratense*, respectively), pineapple weed (*Matricaria matricarioides*), timothy (*Phleum pratense*), and common plantain (*Plantago major*). We have analyzed the effects of all action alternatives on the potential introduction of other invasive species and spread of existing invasive plants into other areas of the project area. Mitigation measures 14, 18, and 19 will reduce the introduction of new invasive plant species and spread of existing populations. Monitoring activity 11 will monitor introduction of or increased populations of invasive plant species within the project area, which would then be treated with the intention of eliminating populations as they occur.

Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994)

Implementing restoration and mining activities is consistent with Executive Order 12898 because the demographic data for the project area revealed no environmental justice communities and no public comments raised concerns related to environmental justice.

Alaska Water Quality Standards (18 AAC 70)

Implementing stream restoration and mining operations would comply with the state anti-degradation policy (Alaska Department of Environmental Conservation 2012) to prevent deterioration of water bodies that currently meet state water quality standards. The proposed action would result in a number of short-term turbidity pulses which would exceed the State of Alaska water quality standards for turbidity (Alaska Department of Environmental Conservation 2012) during the course of the stream restoration work. We would obtain a Section 404 Permit and a Section 401 permit that would allow the Alaska Department of Environmental Conservation and U.S. Army Corps of Engineers to review proposed restoration practices for the project to assure project impacts to water quality are minimized (USDA Forest Service, Chugach National Forest 2015 page 23 to 24). The restoration would improve long-term water quality conditions by redistributing historic tailings piles and creating stable stream banks that are not likely to have persistent erosion issues (USDA Forest Service, Chugach National Forest 2015, page 101)

Pre-decisional Administrative Review (Objection) Opportunities

This project is subject to a predecisional administrative review process (objection process) pursuant to 36 CFR 218, subparts A and B. My cover letter accompanying this Draft Record of Decision describes the objection process, who is eligible to object, and how to file an objection.

Implementation Date

This project is subject to a 45 day objection period and associated regulations pursuant to 36 CFR 218. I will not sign the final Record of Decision and implementation will not begin until all relevant provisions of 36 CFR 218 are met. I expect that implementation for mining activities will begin in mid-July of 2015 and restoration activities will be implemented when funding becomes available (after mid-July of 2015).

Responsible Official

The responsible official for this project is Terri Marceron, Forest Supervisor, Chugach National Forest.

Contact

For additional information concerning this draft decision, contact: Karen Kromrey, Public Services Staff Officer, Seward Ranger District, Chugach National Forest, PO Box 390, Seward, AK 99664; (907) 288-7745.

References

USDA Forest Service, Alaska Region, 2006. Soil Quality Monitoring. (FSM2554 R-10 Amendment No. R-10 2500-2006-1), USDA Forest Service, Alaska Region, May 2006

USDA Forest Service, Chugach National Forest, 2002a. Revised Land and Resource Management Plan, Chugach National Forest. USDA Forest Service, Alaska Region, R10-MB-480c, May 2002

USDA Forest Service, Chugach National Forest, 2002c. Record of Decision, Revised Land and Resource Management Plan, Chugach National Forest. USDA Forest Service, Alaska Region, R10-MB-480b, May 2002

USDA Forest Service, Chugach National Forest, 2010. Draft Environmental Impact Statement: Resurrection Creek Phase II: Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations. Seward Ranger District, Chugach National Forest. Management Bulletin R10-MB-724. June 2010.

USDA Forest Service, Chugach National Forest, 2015. Final Environmental Impact Statement: Resurrection Creek Phase II: Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations. Seward Ranger District, Chugach National Forest. Management Bulletin R10-XXXX. ADD DATE HERE.

USDA Forest Service, 2010, Soil Management (FSM 2500, Chapter 2550), USDA Forest Service, November 23, 2010.

Appendix A – Maps

Map 1. Vicinity map 21
Map 2. Mining area and restoration corridor map 23
Map 3. Mining infrastructure map 25

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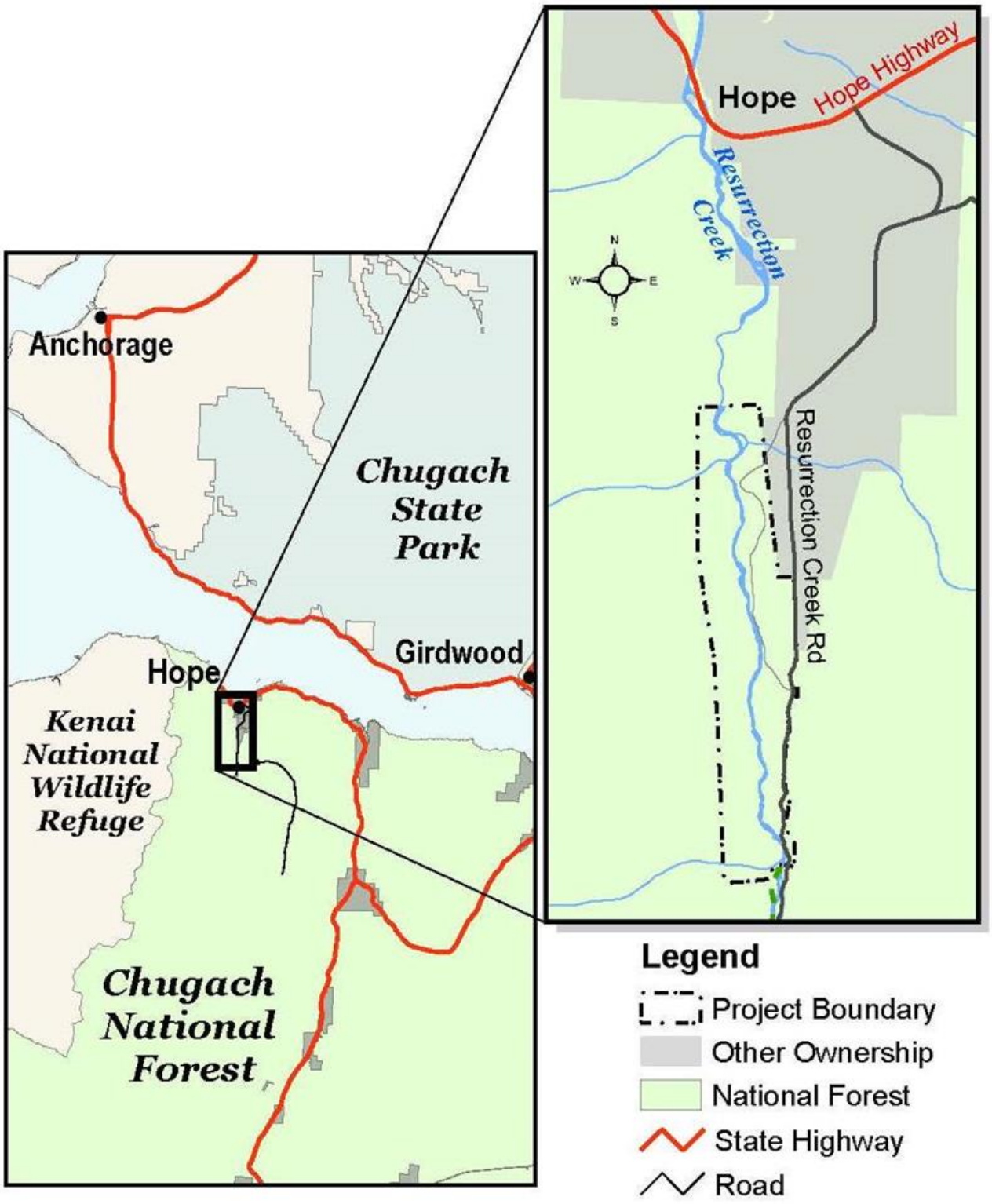

Map 1. Vicinity map

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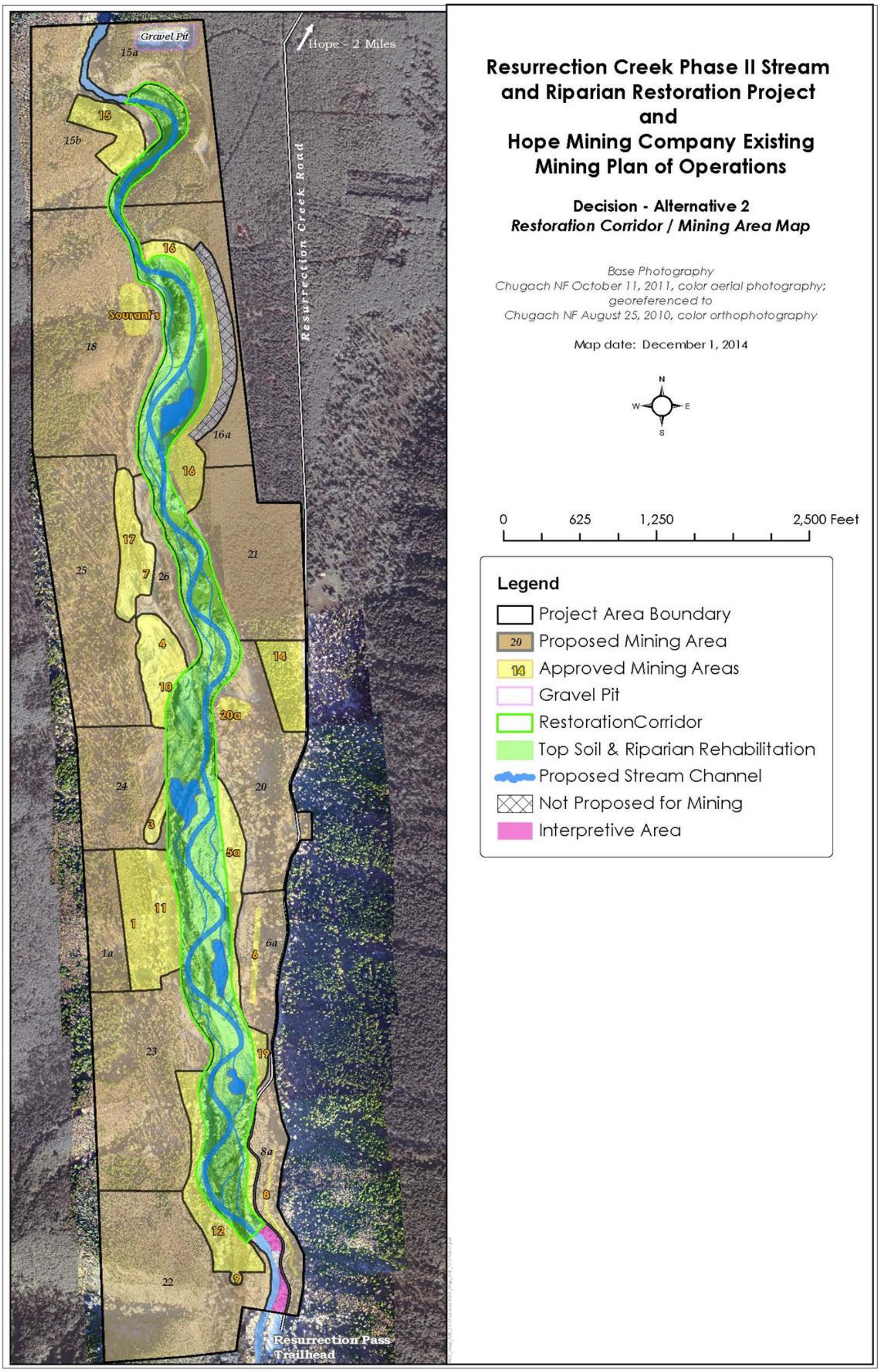

Map 2. Mining area and restoration corridor map

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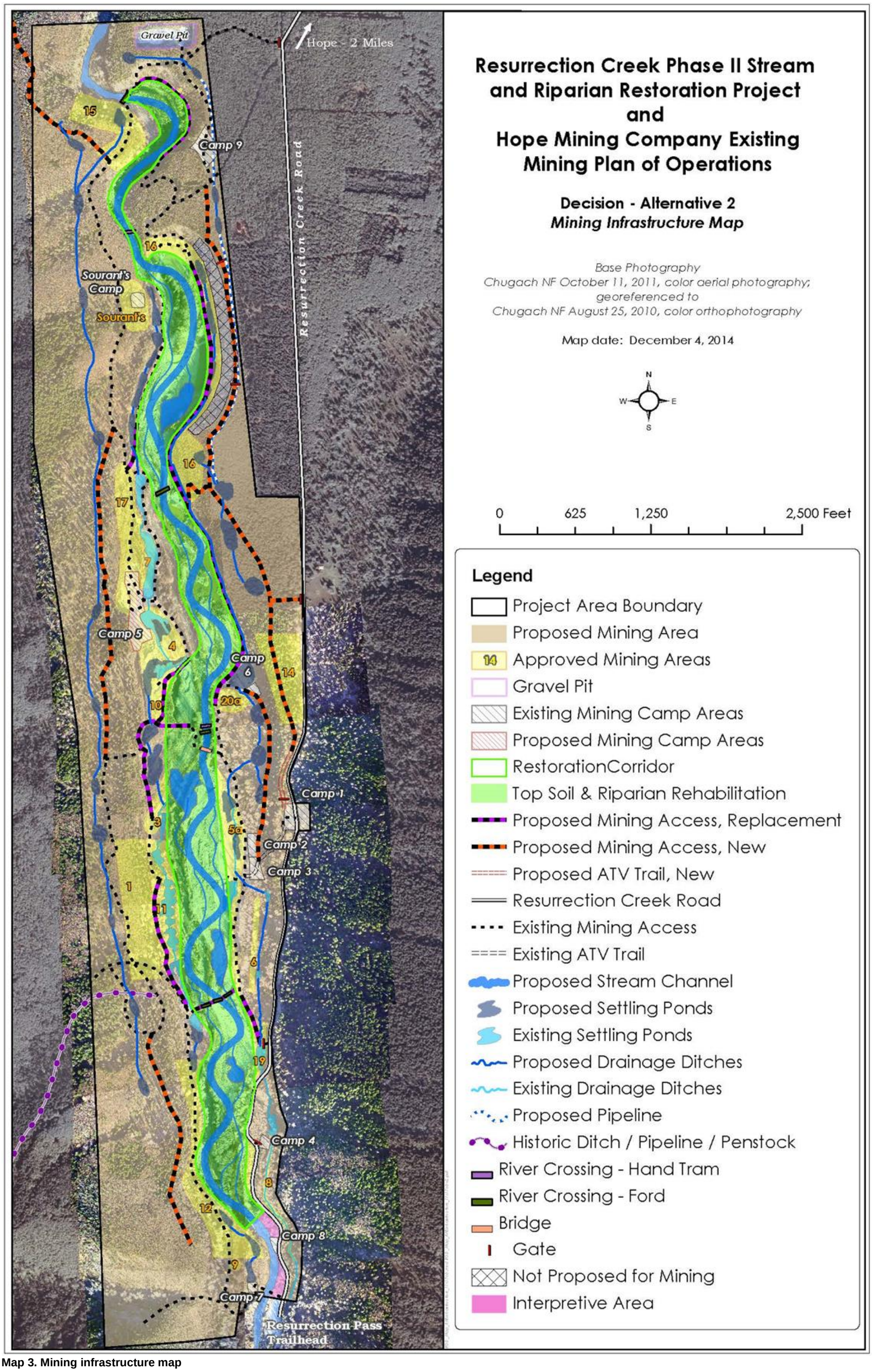

Map 3. Mining infrastructure map

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Appendix B – Mitigation and Monitoring

Mitigation measures

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
X	X	Water Quality Soil Productivity	1	All disturbed areas within the restoration corridor and mining areas such as stockpiled soil areas, reclaimed areas, roads, trails, camps and fueling areas must have an appropriate mechanism in place (ie. berms, silt fences, ditching, mulch, seeding) as specified in restoration contract and plan of operations to limit erosion of soil from disturbed sites. Forest Service will work with restoration contractor or Hope Mining Company to determine best location for these features (field fit) and appropriate mechanism. Where feasible, mulch would include organic material from the site.	This mitigation measure will limit the amount of soil eroded into surface water and into Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum NTUs (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (USDA Forest Service, Chugach National Forest 2015, page 101). This measure will also help limit detrimental soil disturbance by minimizing soil erosion (USDA Forest Service, Chugach National Forest 2015,page 74) (USDA Forest Service, Alaska Region, 2006. Soil and Water Conservation Handbook, Best Management Practices 14.8, 17.5); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Min-4).
	X	Water Quality	2	Restoration-related stream crossings will be held to a minimum (no more than twice per day per piece of equipment where practicable) and will be limited to the designated equipment fords. Crossings will occur from May 15 - July 15 per Alaska Department of Fish and Game specifications.	Crossing Resurrection Creek with equipment causes small turbidity pulses and through limiting these crossings during restoration work, overall effects on water quality can be reduced and stay within State water quality standards (no more than 25 NTUs above background turbidity) (USDA Forest Service, Chugach National Forest 2015, page 101).
X	X	Soil Productivity	3	After contouring disturbed areas, a minimum of 4 inches (where practicable) of top soil should be distributed across the disturbed area. If top soil is not available, use 3/4 inch minus size material or smaller, where available from mining operations, to cover disturbed areas and cover with a layer of organic debris (slash) that was stockpiled from prior to mining. If excess soil is available, keep stockpiled for use in areas that are deficient in soil. Do not spread glacial clay on surface.	Covering the surface with top soil, or at a minimum, 3/4 inch minus size material or smaller and organic debris will reduce detrimental soil disturbance (USDA Forest Service, Chugach National Forest 2015, page 74) (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.8, 17.5).

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
X		Water Quality Soil Productivity	4	Erosion control design features for mining access route construction and maintenance will be determined during field review and discussion between Forest Service and Hope Mining Company prior to the start of any new road construction. Design features may include one or more Best Management Practices identified in the Forest Service Soil and Water Conservation Handbook.	The purpose of this measure is for roads to maintain integrity through effective drainage of water and reduce adverse effects to water quality by limiting the amount of soil eroded into surface water and into Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum turbidity (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (USDA Forest Service, Chugach National Forest 2015, page 101).. This measure will also help limit detrimental soil disturbance by minimizing soil erosion (USDA Forest Service, Chugach National Forest 2015, page 74 ; (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.5, 14.7, 14.8, 14.9, 14.20); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-2, Road-3)
X	X	Water Quality	5	Design and install culverts, bridges or hardened fords across Resurrection Creek, constructed side channels, and mining ditch crossings capable of enduring expected traffic such as dozers, excavators, loaders, fuel trucks, highway vehicles, and ATV's and capable of passing expected 100 year peak flow discharges including 24 hour maximum precipitation events. Inlets and outlets of culverts and bridge abutments should be hardened with large rock to prevent scour and erosion. Fords should be armored with large rock to prevent streambed and stream bank deformity. Rock size will be determined by vehicle and equipment size and frequency of use; small cobble could be used for ATV crossings whereas large cobble and boulders should be used in areas where articulated rock trucks, excavators and bulldozers are crossing frequently.	This mitigation measure will help limit the amount of turbidity produced with daily equipment crossings and ensuring that crossings and bridge construction and placement will withstand higher flow events with limited erosion. With this measure in place, State water quality standards are expected to be met for maximum turbidity (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (USDA Forest Service, Chugach National Forest 2015, page 101) (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.7); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-7).
X		Soil Productivity	6	As specified in mining operating plan, all temporary roads and other compacted surfaces that are not needed in foreseeable future operations will be reclaimed. Where applicable, reclaim by breaking up the surface layers and covering with top soil and organic material	This measure reclaims areas of soil compaction and will allow the old road bed to recover more quickly (USDA Forest Service, Chugach National Forest 2015, page 74 (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.24; USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-6).

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
	X	Water Quality	7	The use of mechanized equipment within the ordinary high-water mark during restoration will only occur if work cannot be performed in the dry above the ordinary high water mark and will be accomplished under the supervision of the Forest Service construction engineer or representative. Approved equipment working within the ordinary high water will have bio-degradable hydraulic fluid conversions. All equipment will be cleaned and free of leaks before use on the restoration implementation.	This measure will reduce the potential of petroleum products entering the surface and ground water in the project area. This mitigation measure follows the State of Alaska Department of Environmental Conservation's "Recommendations for General Construction Projects near a Public Water System" to limit the potential sources of contamination within 1,000 feet from the surface water source component of a known public water system using groundwater under the direct influence of surface water (USDA Forest Service, Chugach National Forest 2015, page 101).
X	X	Water Quality	8	The minimum separation distance between the mean annual high water level of a lake, river, stream, spring, or slough, or the mean high water level of coastal waters, and a lift station, holding tank, septic tank, soil absorption system, seepage pit, pit privy, or other wastewater collection, treatment, or disposal system is 100 feet, measured horizontally.	This measure will reduce the potential of human waste or other waste water entering the surface water system from all camps utilized by restoration contractors and Hope Mining Company personnel and lessees. The measure meets the direction in the State of Alaska Department of Environmental Conservation's "Recommendations for General Construction Projects near a Public Water System" to limit the potential for contamination to enter the water source used by a known public water system (USDA Forest Service, Chugach National Forest 2015, page 101) (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 12.15, 12.16); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-10);
	X	Air Quality	9	Dust abatement through the use of water trucks is required during dry conditions when making multiple daily trips on Resurrection Creek Road using large equipment or large trucks related to restoration. The Forest Service Contracting Officers Representative will determine the frequency of watering/dust abatement.	Reduction in air quality occurred during Phase I restoration project implementation due to dust suspended in air from frequent restoration truck traffic on Resurrection Creek road. Local residents brought up this concern for this project as well. Implementing this measure will keep air quality impacts to a minimum during restoration implementation (USDA Forest Service, Chugach National Forest 2015, page 67).

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
X	X	Damage to cultural resources	10	Although unlikely to be encountered, any and all human remains shall at all times be treated with dignity and respect. Should human remains or any prehistoric objects be encountered, work will be stopped at once in the locality to prevent further disturbance and the Forest Service will be immediately notified. If undocumented historic artifacts such as those commonly used in hydraulic placer mining are discovered during restoration or mining activities, these items may be set aside and restoration or mining activities may continue, and the Forest Service will be notified of these discoveries. The historic dragline located in Area 16 is listed as a contributing feature of the Hope Mining Company Historic Mining District and would be moved by the Forest Service to a location within the boundaries of the Historic Mining District where it won't be damaged by restoration or mining activities.	Hydraulic mining operations occurred in all of the restoration corridor and parts of the proposed mining areas so it is likely that some artifacts from the hydraulic mining era may be discovered during implementation of these projects. Hope Mining Company has followed this measure during past mining operations and notified the Forest archeologist when mining related artifacts have been uncovered. This measure keeps the Forest Service informed of mining artifacts discovered without unduly delaying mining operations or restoration contract implementation. This measure also provides for the protection of the historic dragline (USDA Forest Service, Chugach National Forest 2015, page 129).
X	X	Damage/ destruction of Historic Mining Features	11	Destruction of historic tailings from mining operations and restoration activities within the Hope Mining Company Historic District is unavoidable. The adverse effects were resolved through the execution of a Memorandum of Agreement with the State Historic Preservation Office on December 17, 2009 concerning the development of interpretive displays in the interpretive area near Resurrection Pass National Recreation Trailhead. These displays will be developed in partnership with Hope Mining Company and will describe the formation of the historic tailings and other features of the hydraulic mining period on Resurrection Creek.	The destruction of historic tailings piles is an adverse effect on the historic resources within the project area. Per discussion and agreement with SHPO's office through the Memorandum of Agreement, the Forest Service will continue to work with Hope Mining Company to develop interpretive panels to educate visitors about the hydraulic mining era and the resulting tailings (USDA Forest Service, Chugach National Forest 2015, page 129).
X	X	Public safety	12	Hope Mining Company and Restoration Contractors shall install signing indicating potential hazards from heavy equipment when operating near Resurrection Pass National Recreation Trail and trail bridge. Forest Service will work with Hope Mining Company and restoration contractors to provide wording and placement of signs.	The visitors using Resurrection Pass National Recreation Trail will be walking directly adjacent to mining operations in area 22 (alternative 2 and 3) and potentially restoration operations on the south end of the restoration corridor (alternative 2 only). Cautionary signing at the start of the trail will help visitors be aware heavy equipment operations they may encounter along the first section of trail (USDA Forest Service, Chugach National Forest 2015, page 156).
X	X	Public Safety	13	No equipment associated with the restoration project or mining operations will be staged at the Resurrection Pass North Trailhead or the dispersed camping area upstream from the trailhead.	This measure will ensure that heavy equipment operations are kept separate from recreation visitor use areas reducing public safety hazards (USDA Forest Service, Chugach National Forest 2015, page 156 .

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
	X	Establishment or spread of noxious and invasive plant species	14	All materials brought from off-site to be used for mulching, erosion control, rehabilitation, soil establishment, fill, or other uses should be free of invasive plant species, seeds or plant roots identified in the Forest Service publication*, Selected Invasive Plants of Alaska* (USDA Forest Service, Alaska Region, 2009).	This measure will reduce the potential of invasive plant species becoming introduced within the restoration corridor and within proposed mining areas (USDA Forest Service, Chugach National Forest 2015, page 116; (USDA Forest Service, Chugach National Forest 2002a, page 3-25)
X	X	Soil Productivity	15	If material such as buried clay layers or materials determined by the Forest Service to be unsuitable for surface placement are discovered during ground disturbing activities (restoration channel construction, mining of gravel layers, constructing and maintaining settling ponds, reclamation of mined areas, etc.), these materials will either be placed at least 12 inches below the layer of suitable material that plants will grow in (top soil, finer tailings, etc)., where practicable, or will be buried deeper in a constructed landform such as a terrace or pond bottom during reclamation and/or restoration.	This measure will reduce detrimental soil disturbance by keeping materials which limit productive soil development and vegetation reestablishment well below the surface layer and not interfere with how water drains through top layers of soil and gravel substrates (USDA Forest Service, Chugach National Forest 2015, page 74).
X	X	Soil Productivity	16	Equipment and vehicles will avoid newly placed topsoil on restored and reclaimed areas to avoid compaction.	This measure will reduce detrimental soil disturbance by avoiding compaction and will give plants the best possible growing medium (USDA Forest Service, Chugach National Forest 2015, page 74) .
	X	Soil Productivity	17	Mulch should be applied to newly exposed ground in the restoration corridor as early as possible after completion of the finished placement and/or exposure. Organic mulch such as weed seed free straw, fine wood chips, or moderately ground plant material is recommended. Where feasible, mulch would include use of organic material from the project area. A single layer of mulch is expected to be sufficient (approximately 1 ton per acre). Tackifier may be recommended by the Forest Service depending on expected conditions during and after application.	This measure will reduce detrimental soil disturbance by reducing soil erosion (USDA Forest Service, Chugach National Forest 2015, page 74) .
X	X	Control of noxious and invasive plant species	18	Heavy equipment mobilized into the project area for mining or restoration will be spray washed including wheel wells, undercarriages, tires, tracks before it is brought into the project area so that it is free of all foreign plant materials and soil.	This measure will reduce the potential of new invasive plant species becoming established within the restoration corridor and within previously undisturbed proposed mining areas (USDA Forest Service, Chugach National Forest 2015, page 116 ; (USDA Forest Service, Chugach National Forest 2002a, page 3-25).

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
X	X	Reestablishment of native plant species after disturbance	19	Reclamation of proposed mining areas: Allow areas to naturally revegetate where top soil availability, site conditions, and seed source are favorable towards re-establishing vegetation to meet reclamation objectives. Restoration corridor: Allow areas to naturally revegetate where top soil availability, site conditions, and seed source are favorable towards re-establishing vegetation to meet restoration objectives. When natural re-vegetation conditions are not favorable, plant native plant species (seed source, cuttings) from the local environment of the project area to maintain local genetic composition.	This measure will help reestablish native plant species to the disturbed site meeting Forest Plan guidelines (USDA Forest Service, Chugach National Forest 2015, page 115); (USDA Forest Service, Chugach National Forest 2002a, page 3-25); (USDA Forest Service, Alaska Region, 2006. Soil and Water Conservation Handbook, Best Management Practices 12.6).
X	X	Habituation and food conditioning of bears	20	Food, fuel, and garbage will be stored in a manner that bears cannot obtain them (bear proof containers, vehicles, and container storage units) to reduce potential for negative bear/human interactions or bear habituation. All garbage must be removed regularly from the site and properly disposed.	This measure will avoid habituation and food conditioning of bears (USDA Forest Service, Chugach National Forest 2015, page 125); (USDA Forest Service, Chugach National Forest 2002a, page 3-28); (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 12.16).
	X	Wildlife habitat	21	Where feasible, retain clumps of largest old cottonwoods and spruce in the existing flood plain in Area 19, the Interpretive Area, northwest of bridge crossing location, and Area 16 to maintain diverse wildlife habitat components that would otherwise take many decades to become re-established.	This measure keeps some components of wildlife habitat intact during restoration activities and be a seed source for areas that have been disturbed (USDA Forest Service, Chugach National Forest 2015, page 123).
	X	Damage to mining improvements and equipment	22	Protect all known mining operations improvements (such as claim corner monuments, camps, equipment, and survey monuments, etc.), during restoration activities by clearly identifying items and areas on the ground, documenting locations with global positioning system (GPS) equipment, and adding specifications to the restoration contracts that documented items will be replaced by contractor at their expense if disturbed.	This measure meets the intent described in the 2007 agreement with Hope Mining Company describing protection of Hope Mining Company property for the duration of the restoration implementation (USDA Forest Service, Chugach National Forest 2015, page 265).
X	X	Mining operations and restoration coordination and safety	23	Agreement on gate closures, operation procedures, camps and protection of Hope Mining Company private property and equipment will be reached between Hope Mining Company and the Forest Service before mobilization of restoration equipment. Mining operations and restoration implementation activities will be separated by the greatest distance possible. Regular safety meetings between Hope Mining Company, mine operators, the Forest Service, and restoration contractors will occur to maintain communication and safety.	This measure meets the intent described in the 2007 agreement with Hope Mining Company describing protection of Hope Mining Company property, coordination of operations, and reducing hazards to Hope Mining Company lessees and restoration contractors for the duration of the restoration implementation (USDA Forest Service, Chugach National Forest 2015, page 265)

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
	X	Mining operations and restoration coordination	24	Hope Mining Company shall retain reasonable access to all approved mining operations during restoration activities. If an existing mining access route is taken out during restoration, a new route will be constructed to the same standard outside restoration corridor prior to decommissioning. Settling ponds within restoration corridor will be replaced on a volume for volume basis outside the corridor by the Forest Service. Any mining ditch segments within the restoration corridor will be replaced by the Forest Service to maintain a comparable ditch system outside the restoration corridor.	This measure meets the intent described in the 2007 agreement with Hope Mining Company describing keeping reasonable access, ponds, and ditches for mining operations during restoration implementation (USDA Forest Service, Chugach National Forest 2015, page 265).
X	X	Water Quality	25	Forest Service will work with Hope Mining Company for design and placement of settling ponds and ditch networks to contain all sediment laden process water as well as runoff, seepage and expected precipitation. Settling ponds will be designed for 10 year, 24 hour storm event. The 10 year discharge elevations will be designated by the Forest Service and/or Department of Environmental Conservation and are on average four feet above the bed of the stream channel. New or reconstructed settling ponds and storage areas will be located in places where they will not be washed out by reasonably predictable seasonal fluctuations in water level and freeze/thaw action. When cleaning out settling ponds, place materials from ponds in locations where liquids ("sludge") from materials cannot flow overland into Resurrection Creek and its tributaries.	This mitigation measure will help reduce adverse effects to water quality by limiting the amount of turbid water entering Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum NTUs (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (USDA Forest Service, Chugach National Forest 2015, page 101); (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.3, 14.5).
x	x	Water Quality	26	Fuel delivery and transfer processes will be conducted in a manner that minimizes the potential for spills and contamination of soil and water and will follow all state and federal regulations. Fuel and oil storage facilities will be located, designed, constructed, and maintained in manner that minimizes the potential for contamination of surface and subsurface soil and water resources. All active fuel storage containers will be in good repair and will be repaired or removed if leaking is detected. An impermeable liner will be placed under and around fuel storage and filling areas that is large enough to capture 110 percent of container capacity as required by Alaska Department of Environmental Conservation. Heavy equipment used in mining and restoration work will be kept in good repair to prevent spills and persistent leaking of petroleum fluids.	This measure will reduce the potential of petroleum products entering the surface and ground water in the project area. This measure is also required by Alaska Department of Environmental Conservation in the Aboveground Storage Tank Operator Handbook (Alaska Department of Environmental Conservation 2003, section 1, page 8). This mitigation measure follows the State of Alaska Department of Environmental Conservation's "Recommendations for General Construction Projects near a Public Water System" to limit the potential sources of contamination within 1,000 feet from the surface water source component of a known public water system using groundwater under the direct influence of surface water (USDA Forest Service, Chugach National Forest 2015, page 101); (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 12.8).

Mining Activities	Restoration Activities	Issues and/or Effects Addressed	Mit. #	Mitigation and Control Measures	Need for Mitigation Measure
X		Water Quality Soil Productivity	27	When determined necessary by the Forest Service, mining operator will re-contour steep slopes to their natural slope angle, not to exceed 35 degrees (about 72 percent) and revegetate steep areas (greater than 35 percent) with seed mixture, mulch, and/or organic materials and use other erosion control measures as specified by Forest Service in plan of operations. When bedrock is exposed during mining, mining operator will re-contour tailings around and covering bedrock where reasonably practicable.	This mitigation measure will help reduce adverse effects to water quality by limiting the amount of soil eroded into surface water and draining into Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum NTUs (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (USDA Forest Service, Chugach National Forest 2015, page 101). This measure will also minimize risk of landslides by keeping the slope angle to below 72 percent or 35 degrees, (USDA Forest Service, Chugach National Forest 2015, page 76).; (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.7).
X	X	Water Quality	28	If any concentrations of mercury are encountered or observed during mining or restoration operations, work within the immediate area will cease and the Forest Service will immediately be notified. The Forest Service will coordinate with Hope Mining Company or the restoration contractor to safely implement established protocols for mercury cleanup (US Environmental Protection Agency 2009).	Hope Mining Company does not use mercury in any of its operations. Historic placer mining operations used elemental mercury for separating fine gold particles from the collected concentrate captured in the sluice box and some mercury may have been lost or spilled. Mercury can pose a threat to the survival of fish eggs and younger life phases, as they are more susceptible to mercury toxicity. This measure is to ensure immediate cleanup of any concentrations of mercury if found during mining or restoration activities (USDA Forest Service, Chugach National Forest 2015, page 101).

Monitoring Activities

Monitoring Activity	Elements	Description
Monitoring Activity 1		**Effectiveness of location, design, and maintenance of pond and ditch systems in keeping turbid processed water separate from surface waters during mining operations**
	When Applicable?	Mining and Restoration Activities
	Method of Measurement	Visually inspect and document if turbid water is present in Resurrection Creek or other surface water tributaries. If turbid water is present take turbidity measurement above and below the pond and ditch systems to ascertain if there is any increase in turbidity levels.
	Frequency of Measurement	Varies, Weekly when turbid water is present in pond/ditch system
	Threshold of Variability	Visual evidence or water quality data collected that demonstrate nonpoint source pollution control measures are not installed correctly, maintained, or operationally effective. Nonconformance with Alaska Pollutant Discharge Elimination System Permit. Turbidity measurements may not exceed 25 nephelometric turbidity units (NTU) above natural conditions when the natural turbidity is 50 NTU or less, and may not have more than 10% increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 25 NTU.
	Action To Be Taken	Contact mining operator and Alaska Department of Environmental Conservation to determine actions necessary to bring mining activities into compliance
	Authority	Plan of Operations, 36 CFR 228.8(b)
	Responsible Party to Conduct Monitoring	Minerals Administrator, Hydrologist
Monitoring Activity 2		**Effectiveness of mitigation measures in preventing soil from eroding off of disturbed sites and reclaimed areas into surface waters during mining operations**
	When Applicable?	Mining Activities
	Method of Measurement	Visually inspect areas near mining activities and reclaimed areas to verify if soil erosion is occurring and is causing, or potential to cause, turbid water to enter surface waters
	Frequency of Measurement	Varies, Weekly at a minimum when mining activities are occurring
	Threshold of Variability	Fine soil particles eroding from coarser gravels, rills, water flowing down road surface rather than channeled off surface. Visual evidence or water quality data that demonstrate erosion control measures are not installed correctly, maintained, or operationally effective. Non-compliance with Alaska Pollutant Discharge Elimination System Permit and pertinent Best Management Practices
	Action To Be Taken	Contact mining operator and Alaska Department of Environmental Conservation to determine actions necessary to bring mining activities into compliance. Require additional or improved erosion control measures be implemented to prevent erosion
	Authority	Plan of Operations, 36 CFR 228.8(b)
	Responsible Party to Conduct Monitoring	Minerals Administrator, Hydrologist, Soils Scientist

Monitoring Activity	Elements	Description
Monitoring Activity 3		**Effectiveness of design criteria in reducing turbidity during channel relocation and construction**
	When Applicable?	Mining and Restoration Activities
	Method of Measurement	Measuring amount of suspended solids in Resurrection Creek with hand held turbidimeter.
	Frequency of Measurement	During each diversion, measure turbidity with upstream from diversion, at diversion, and 1/2 mile downstream from diversion at 1/2 hour intervals
	Threshold of Variability	Non-conformances with Army Corps of Engineer permit, Title 16 permit, Clean Water Act, State of Alaska water quality standards.
	Action To Be Taken	Require additional or improved turbidity control measures, such as pumps or alternative methods of diversion (partial diversion or staged diversion).
	Authority	Restoration contract, Plan of Operations, 36 CFR 228.8(b).
	Responsible Party to Conduct Monitoring	Forest Service Hydrologist, Contracting Officer's Representative, Minerals Administrator
Monitoring Activity 4		**Effectiveness of mitigation measures and designs of reclaimed areas, roads, ponds, ditches, and other mining infrastructure in shedding storm water in compliance with Stormwater Pollution Prevention Plan.**
	When Applicable?	Mining Activities
	Method of Measurement	Visually inspect mining areas and infrastructure for signs of turbid water entering surface waters
	Frequency of Measurement	Varies; during or as soon after a five year flood event as feasible (defined at 1400 cubic feet per second or about 50% higher than bankfull at 800-900 cubic feet per second)
	Threshold of Variability	Non-compliance with Alaska Pollutant Discharge Elimination System permit and measures specified in Stormwater Pollution Prevention Plan
	Action To Be Taken	Contact mining operator and Alaska Department of Environmental Conservation to determine actions necessary to bring mining activities into compliance.
	Authority	Plan of Operations, 36 CFR 228.8(b)
	Responsible Party to Conduct Monitoring	Minerals Administrator, Hydrologist
Monitoring Activity 5		**Effectiveness of construction designs in maintaining stable, self- maintaining stream channels, banks, and streambed features**
	When Applicable?	Restoration Activities
	Method of Measurement	Monitor new stream channels and side channels/ponds for vertical and horizontal stability by measuring topographic stream channel features of permanent cross-sections, longitudinal profiles, and taking linear measurements of stream banks and area of streambed.
	Frequency of Measurement	Monitored yearly for the first five years after spring peak flow runoff. After first five years the project area should be monitored once every five years or after a significant peak flow flood as determined by the Forest Hydrologist, and if notable streambed degradation or aggradation has occurred and/or stream channel avulsions occur.
	Threshold of Variability	Plus or minus 15% change in vertical or horizontal change is expected to occur as a result of natural channel dynamics. Percentage of linear stream banks measured as unstable (actively eroding, no vegetation) greater than 20% of total stream bank and/or exposed clay layers in streambed producing turbidity.
	Action To Be Taken	Forest Service specialists determine necessary actions for improving restored channel stability
	Authority	Forest Service Record of decision,
	Responsible Party to Conduct Monitoring	Forest Service Hydrologist, Fisheries Biologist

Monitoring Activity	Elements	Description
Monitoring Activity 6		**Adult salmon utilization and population trends during spawning season in Resurrection Creek within project area boundary**
	When Applicable?	Mining and Restoration Activities
	Method of Measurement	Conduct pink, chum, Chinook, coho and sockeye redd surveys and adult presence snorkel and bank surveys within the project area to develop spawner ratios by species compared to those recorded in Phase I restoration area and area before the implementation of restoration and proposed mining activities
	Frequency of Measurement	Monitor salmon spawning at least every two weeks during peak spawning periods for five years after stream channel changes are implemented
	Threshold of Variability	Significant changes in salmon spawning or presence (+/- 25%) in Resurrection Creek within project area.
	Action To Be Taken	Assessment of aquatic habitat and salmon spawning substrate would be conducted within the project area
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Fisheries Biologist
Monitoring Activity 7		**Effectiveness of stream channel reconstruction in providing aquatic habitat within the project area**
	When Applicable?	Restoration Activities
	Method of Measurement	Quantify linear length of habitat features (pools, riffles and glides) and photograph aquatic habitat (e.g., spawning glides, riffles, pools), substrate size, vegetation, and woody debris in Resurrection Creek.
	Frequency of Measurement	One year prior to implementation, within two years after implementation, and after the first 25 year sized flood event that occurs following implementation
	Threshold of Variability	Greater than + or - 15% change in percent glide, pool & riffle area (+/- 15% is expected to occur as a result of natural channel dynamics)
	Action To Be Taken	Forest Service specialists determine necessary actions for improving restoration channel stability if vertical or horizontal differences of greater than +/-15% occur.
	Authority	Forest Service Record of decision
	Responsible Party to Conduct Monitoring	Forest Service Hydrologist, Fisheries Biologist
Monitoring Activity 8		**Slope Reclamation on slopes originating at 35% grade**
	When Applicable?	Mining Activities
	Method of Measurement	Conduct inspection of resulting slope grade and materials used for reclamation
	Frequency of Measurement	At start of, during, and immediately after reclamation, then 1 year, 3 years and 5 years after reclamation is complete.
	Threshold of Variability	Visible signs of any landslides, surface erosion, slumping, and lack of successful revegetation
	Action To Be Taken	Contact mining operator to determine necessary steps to remove non- conforming materials, reduce slope, and/or require further erosion control measures be implemented
	Authority	Plan of Operations, 36 CFR 228.8(g)
	Responsible Party to Conduct Monitoring	Forest Service Minerals Administrator and Soils Scientist

Monitoring Activity	Elements	Description
Monitoring Activity 9		**Effectiveness of reclamation measures to re-establish vegetation on mined areas.**
	When Applicable?	Mining Activities
	Method of Measurement	Vegetation surveys measuring % plant cover/species composition and soil depth after reclamation.
	Frequency of Measurement	Vegetation surveys yearly for 5 years; measure soil depth on vegetation survey plots first year only
	Threshold of Variability	At year five, verify 60% of plots in reclaimed area have at least 50% of vegetation (herbaceous and woody) re-established.
	Action To Be Taken	Determine feasible actions Forest Service can take to increase vegetation reestablishment: increase soil coverage/depth, reseeding or planting. Use information collected to develop better reclamation techniques for future plans of operation approvals.
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Minerals Administrator, Ecologist
Monitoring Activity 10		**Effectiveness of restoration activities within the restoration corridor to meet objectives for reestablishing vegetation.**
	When Applicable?	Restoration Activities
	Method of Measurement	Conduct standard vegetation stocking survey plots within restoration corridor specifically for tree species. Include photo points with stocking survey plots.
	Frequency of Measurement	Conduct baseline vegetation survey prior to restoration, then at year 3, 5 and 10 after completion of revegetation activities following stream restoration.
	Threshold of Variability	At 5 years after revegetation, stocking surveys should meet R10 stocking certification (300 tree species stems per acre, minimum 4 inch height). After 10 years, 60% of stocking survey plots should show tree species composition that meets restoration objectives.
	Action To Be Taken	If stand not fully stocked at 5 years or species composition not developing toward species composition objectives, consider options of additional topsoil distribution, planting, and seeding spruce/birch. Re-do stocking surveys at year 5 after actions taken.
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Ecologist and Forester
Monitoring Activity 11		**Introduction of or increased populations of non-native plant species within project area.**
	When Applicable?	Mining and Restoration Activities
	Method of Measurement	Conduct invasive plant surveys within project area (disturbed areas, reclaimed areas, and restoration corridor).
	Frequency of Measurement	1st and 3rd year after first complete growing season following completion of restoration activities and reclamation of mining areas.
	Threshold of Variability	New non-native populations have been introduced or existing populations are expanding.
	Action To Be Taken	Design and implement feasible control measures for specific species. Conduct vegetation survey 3rd year after additional control work is completed.
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Ecologist

Appendix C – Permits, Licenses

The Forest Service would need to obtain the following permits to implement stream restoration described in this decision:

1. Title 16 Fish Habitat Permit from Alaska Department of Fish and Game for all stream diversions, instream work, and stream crossings for restoration work.
2. Section 404 Permit from the U.S. Army Corps of Engineers for work within wetlands during restoration work. This Section 404 permitting process requires approval of a Section 401 (Water Quality) permit from the Alaska Department of Conservation.
3. Temporary Water Use Permit from Alaska Department of Natural Resources may be required for diversions of Resurrection Creek during restoration work.

Hope Mining Company or their lessees would need to obtain the following permits, authorizations, or licenses prior to the Forest Service approving specific mining operations described in this decision:

1. Alaska Pollutant Discharge Elimination System Permit from the Alaska Department of Environmental Conservation to control quantity of turbid water entering surface/groundwater systems from mining activities.
2. Title 16 Fish Habitat Permit from Alaska Department of Fish and Game for stream crossings for mining access.
3. A Spill Prevention Control and Countermeasure Plan required by the Alaska Department of Environmental Conservation and Environmental Protection Agency for aggregate aboveground storage capacity of 1,320 gallons or more and minimum container size of 55 gallons of petroleum products.
4. A Temporary Water Use Permit may be required by Alaska Department of Natural Resources for mining activities that utilize surface water.
5. Mining License from Alaska Department of Revenue for any mining activity in Alaska
6. Small and Medium Suction Dredge, Mechanical Placer Permit from the Alaska Department of Environmental Conservation for processing gold by suction dredging and discharging into water of the United States.
7. Regional General Permit from U.S. Army Corps of Engineers for placer mining activity when surface disturbance is 10 acres or less and an Individual Permit for operations greater than 10 acres.